# INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/01163

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: F16L 11/12
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | SE 368449 B (FRANKISCHE ISOLIERROHR- U. METALLWAREN-WERKE GEBR. KIRCHNER), 1 July 1974 (01.07.74), figure 3 -- | 1,5,6 |
| X | US 3050087 A (D.M. CAPLAN), 21 August 1962 (21.08.62), figures 1-3 -- | 1,5,6 |
| X | US 3318335 A (C.M. HELLER), 9 May 1967 (09.05.67), figures 1-34 -- | 1,5,6,10 |
| X | US 5397157 A (HEMPEL ET AL), 14 March 1995 (14.03.95), figure 1 -- | 1,5,6 |

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 26 Sept 2000 | 13 -10- 2000 |
| Name and mailing address of the ISA/<br>Swedish Patent Office<br>Box 5055, S-102 42 STOCKHOLM<br>Facsimile No. +46 8 666 02 86 | Authorized officer<br>Axel Lindhult / MRo<br>Telephone No. +46 8 782 25 00 |

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/01163

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | SE 403564 B (AB ELECTROLUX), 28 August 1978 (28.08.78) -- --- | |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

01/08/00

International application No.
PCT/SE 00/01163

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| SE 368449 B | 01/07/74 | AU 466415 B | 30/10/75 |
| | | AU 3712671 A | 28/06/73 |
| | | DE 2104294 A | 03/08/72 |
| | | FR 2124718 A | 22/09/72 |
| | | GB 1370679 A | 16/10/74 |
| US 3050087 A | 21/08/62 | NONE | |
| US 3318335 A | 09/05/67 | NONE | |
| US 5397157 A | 14/03/95 | DE 4310510 A,C | 06/10/94 |
| | | JP 2766180 B | 18/06/98 |
| | | JP 7055003 A | 03/03/95 |
| SE 403564 B | 28/08/78 | BE 851228 A | 31/05/77 |
| | | DE 2705335 A | 18/08/77 |
| | | GB 1516612 A | 05/07/78 |
| | | SE 7601503 A | 12/08/77 |

RECORD CO

# PCT
## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty

For receiving Office use only

PCT/ SE 00 / 0 1 1 6 3
International Application No.

0 6 -06- 2000
International Filing Date

The Swedish Patent Office
PCT International Application
Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference *(if desired)(12 characters maximum)* 2006531

**Box No. I TITLE OF INVENTION**

"HOSE"

**Box No. II APPLICANT**

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

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☐ This person is also inventor.

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Facsimile No.

Teleprinter No.

State *(that is, country)* of nationality: SE

State *(that is, country)* of residence: SE

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

**Box No. III FURTHER APPLICANT(S) AND/OR /FURTHER INVENTOR(S)**

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

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This person is:

☐ applicant only
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**Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

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☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent

**Box No. V DESIGNATION OF STATES**

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked)*:

**Regional Patent**

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| ☒ | **LK** | Sri Lanka | | | | |

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☒ AG Antigua and Barbuda

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)*

PCT/SE 00 / 01163

06 -06- 2000



**Box No. VI PRIORITY CLAIM** ☐ Further priority claims are indicated in the Supplement Box.

| Filing date of earlier application (day/month/year) | Number of earlier application | Where earlier application is: national application: country | regional application:* regional Office | international application: receiving Office |
|---|---|---|---|---|
| item (1) 29 June 1999 | 9902452-3 | SWEDEN | | |
| item (2) 8 October 1999 | 9903626-1 | SWEDEN | | |
| item (3) | | | | |

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office)* identified above as item(s): 1 and 2

** Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.*

**Box No. VII INTERNATIONAL SEARCHING AUTHORITY**

**Choice of International Searching Authority (ISA)** *(If two or more International Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):*

ISA / SE

**Request to use results of earlier search; reference to that search** *(if an earlier search has been carried out by or requested from the International Searching Authority):*

| Date (day/month/year) | Number | Country (or regional Office) |
|---|---|---|
| 29.06.99 | SE 99/00912 | SWEDEN |
| 8.10.99 15.12.99 | SE 99/01597 | SWEDEN |

20/SE

**Box No. VIII CHECK LIST; LANGUAGE OF FILING**

This international application contains the following **number of sheets:**

| | |
|---|---|
| request | : 3 |
| description (excluding sequence listing part) | : 7 |
| claims | : 3 |
| abstract | : 1 |
| drawings | : 3 |
| sequence listing part of description | : |
| **Total number of sheets** | : 17 |

**Figure of the drawings** which should accompany the abstract: 1

This international application is **accompanied by** the item(s) marked below:

1. ☒ fee calculation sheet
2. ☐ separate signed power of attorney
3. ☐ copy of general power of attorney; reference No., if any:
4. ☐ statement explaining lack of signature
5. ☐ priority document(s) identified in Box No. VI as item(s):
6. ☐ translation of international applications into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listning in computer readable form
9. ☒ other (specify): ITS, Copy of official action

**Language of filing** of the international application: Swedish

**Box No. IX SIGNATURE OF APPLICANT OR AGENT**

*Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).*

Göteborg, 5 June 2000

Bo Lindberg

Authorised Representative / AWAPATENT AB

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| | | |
|---|---|---|
| 1. Date of actual receipt of the Purported international application: 06 -06- 2000 | | 2. Drawings: ☒ received: ☐ not received: |
| 3. Corrected date of actual receipt due to later but Timely received papers or drawings completing the purported international application: | | |
| 4. Date of timely receipt of the required Corrections under PCT Article 11(2): | | |
| 5. International Searching Authority (if two or more are competent): ISA/SE | 6. ☐ Transmittal of search copy delayed until search fee is paid. | |

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Date of receipt of the record copy by the International Bureau: 27 JUL 2000 (27.07.00)



*See Notes to the request form*

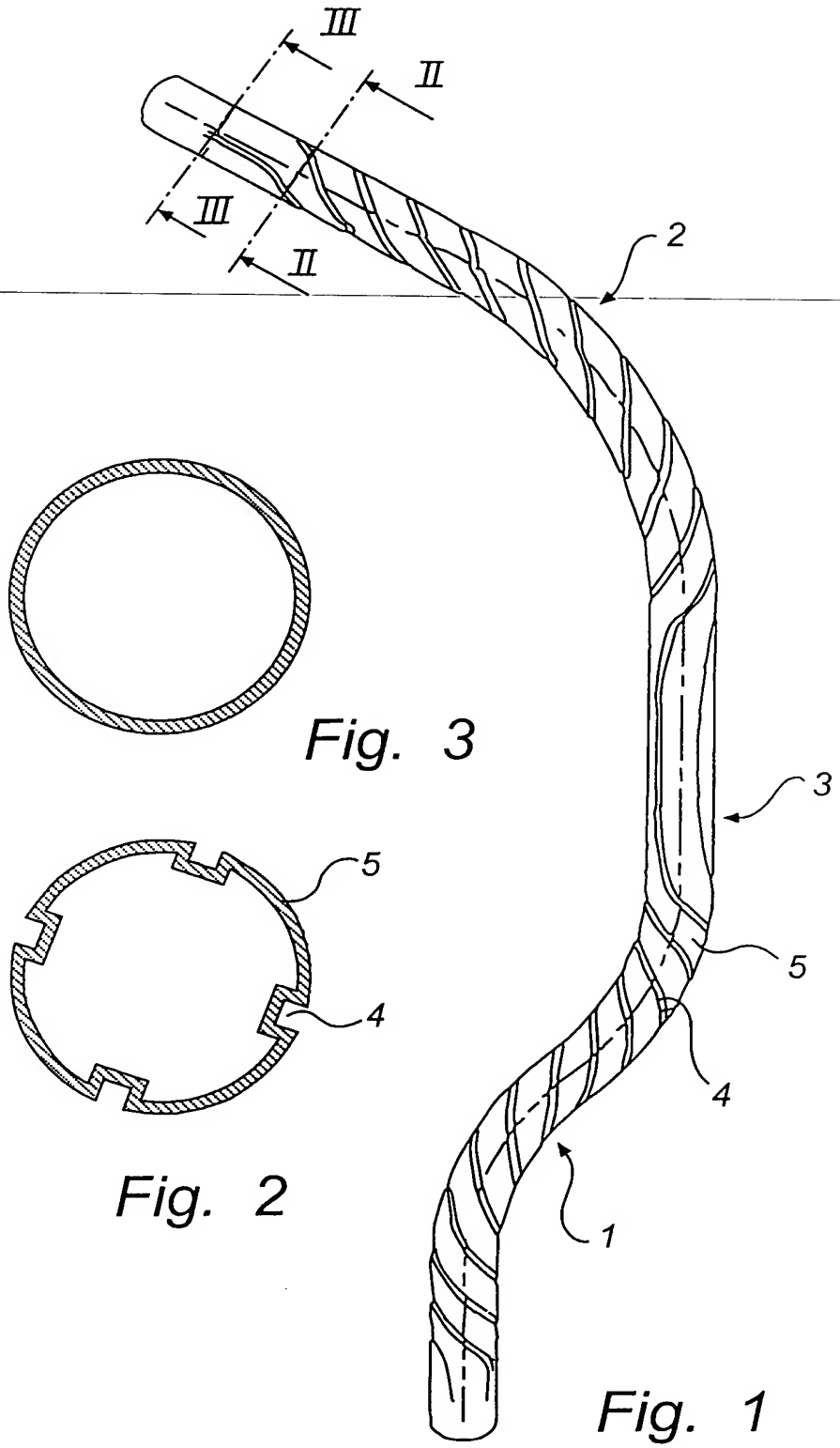


Fig. 1



Fig. 3




Fig. 2

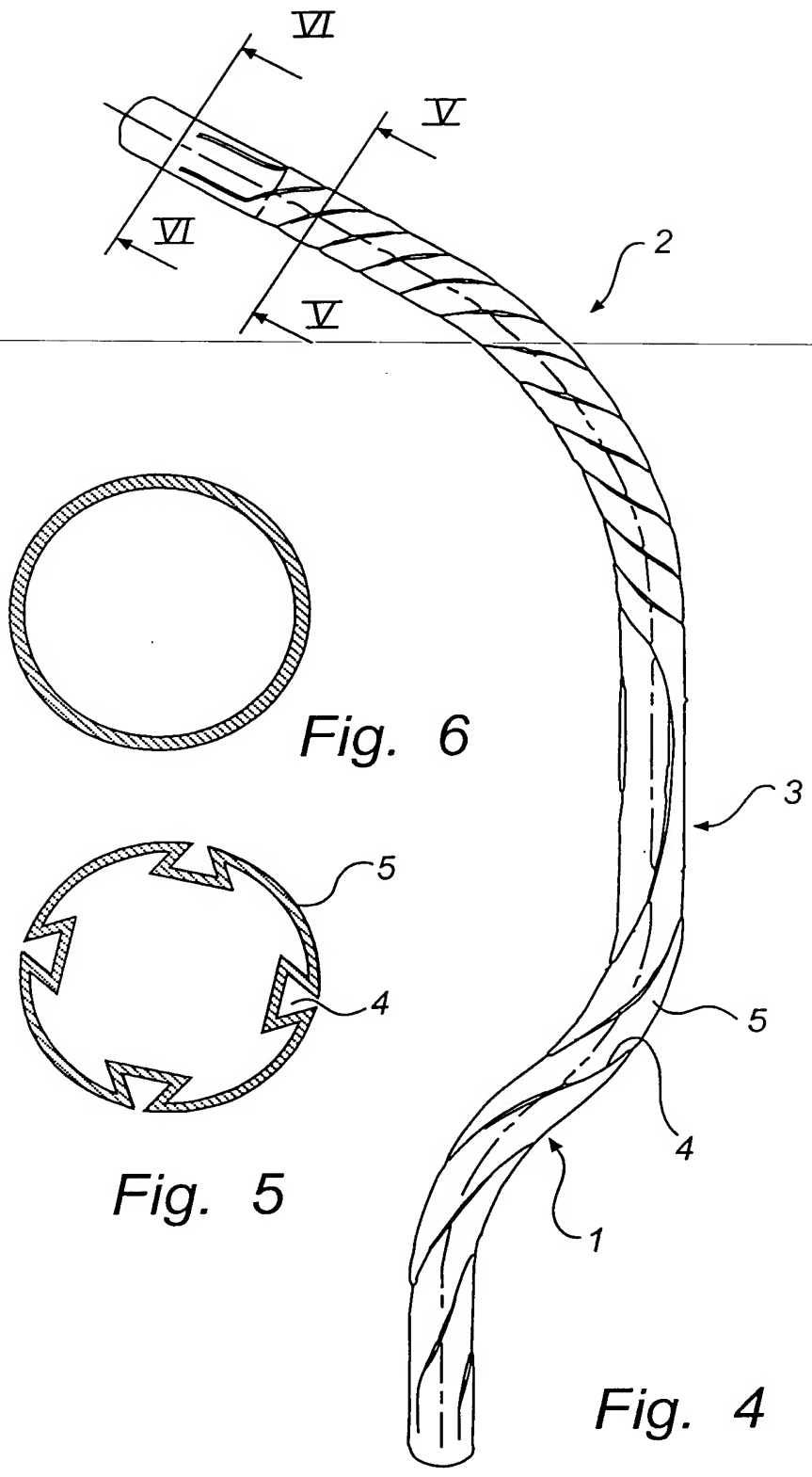


Fig. 6

Fig. 5

Fig. 4

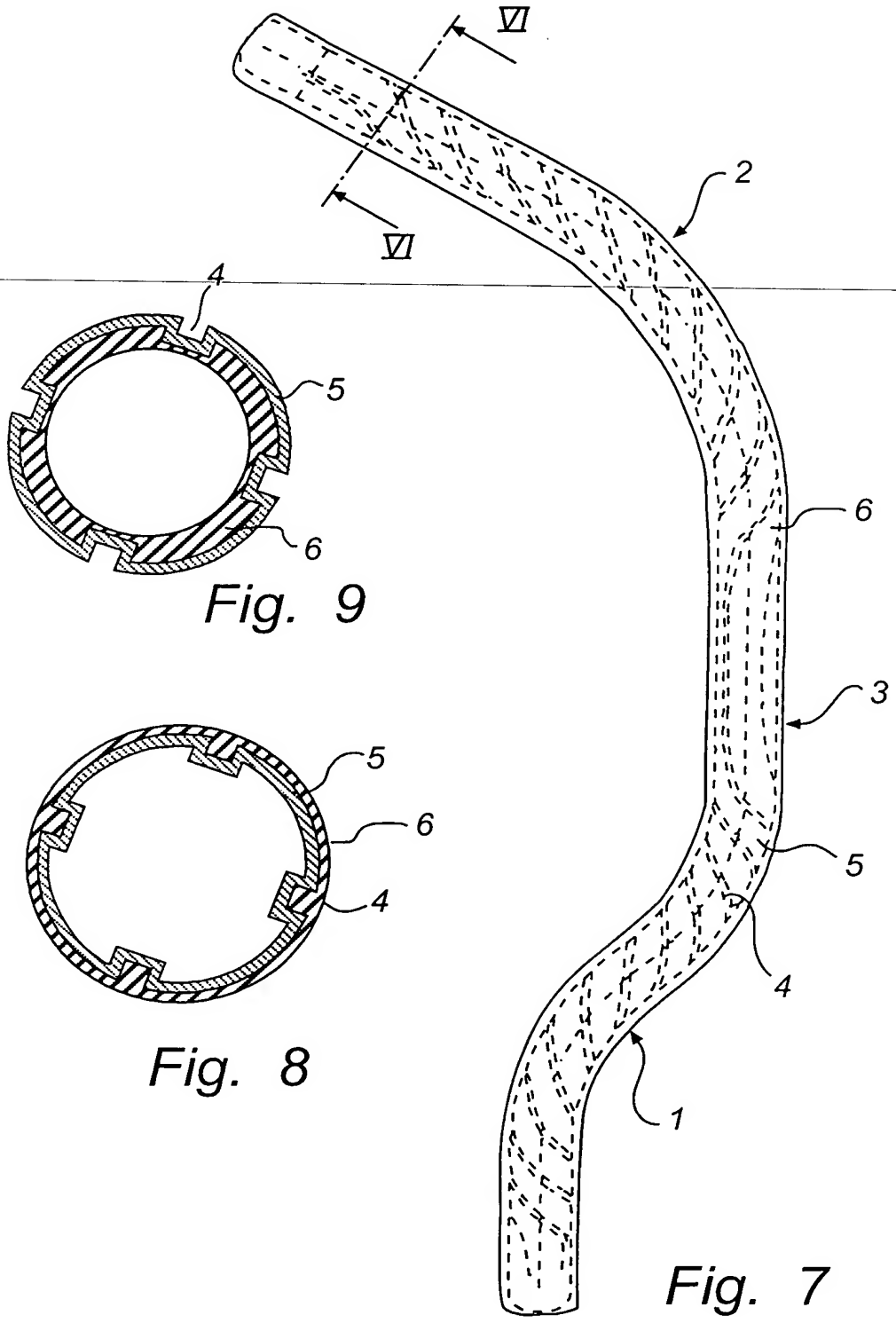


Fig. 7




Fig. 9




Fig. 8

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Kontor/Handläggare
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ABA OF SWEDEN AB
Ansökningsnr
Vår referens
SE-2006045



# SLANG

## Tekniskt område

Föreliggande uppfinning avser en mediumupptagande slang, företrädesvis för tryckmedium och för användning i exempelvis motorrum, varvid slangens vägg innefattar åtminstone ett väggdelparti, vilket är sammanbundet med åtminstone ett expansionsparti för att bilda en kontinuerlig slangmantel. Slangens omkrets är varierbar mellan ett minsta värde, då expansionspartiet är oexpanderat, och ett största värde, då expansionspartiet är maximalt expanderat.

Uppfinningen avser även ett förfarande för tillverkning av en sådan slang.

## Bakgrundsteknik

Slangar av det slag som används i motorrum utsätts för varierande påverkan från omgivningen. De kan till exempel utsättas för tryck, inifrån eller utifrån, eller för relativt kraftiga vibrationer, då motorn är i drift. Utrymmet för slangar i motorrum och dylikt är vanligtvis starkt begränsat. För att få en utrymmesmässigt kompakt motorenhet krävs ofta att slangarna har förformats och krökts i bestämda riktningar för att passas in mellan motorns övriga delar. Ett bekymmer finns dock i det att slangen, då den trycksätts, tenderar att förflyttas eller bukta ut i motorrummet. Den kan därvid komma att anligga mot andra delar av motorkroppen, som t ex på grund av sin temperatur är skadliga för slangen. Denna situation kan även uppstå då slangen vibrerar när motorn är i drift. Både trycksättning och vibrationer är dessutom påfrestande för slangens infästning i motorenheten.

Det finns idag ett flertal slangar som har någon typ av bälgkonstruktion vid ändarna, för att på så sätt minska vibrationerna vid slangens infästning. Dessa

inverkar dock inte på rörelsen hos de olika delarna av slangen i stort, utan dessa är fortfarande väsentligen fria och kan stöta emot näraliggande föremål.

En sådan slang visas t ex i EP 0 791 775, där flexibla partier vid slangens ändar kombineras med ett stelt slangparti i slangens mitt. Vid slangändarna tas vibrationer upp i slangens längdriktning, men för övrigt får slangen röra sig fritt.

## Sammanfattning av uppfinningen

Ovanstående problem löses enligt uppfinningen med en slang av det inledningsvis nämnda slaget, varvid slangens sagda expansionsparti sträcker sig i slangens tvär- och längdriktning, varvid, när omkretsen ökar och expansionspartiet expanderar, delpartierna förskjuts relativt varandra både i slangens tvär- och längdriktning.

Genom att expansionspartiet sträcker sig i slangens tvär- och längdriktning, kommer väggdelpartierna att förskjutas i både tvär- och längdriktningen vid t ex trycksättning av slangen. Partiernas rörelseriktning vid trycksättning kan på så sätt styras, så att slangen inte riskerar att vidröra andra komponenter i t ex en motorenhet. Expansionspartiet kan sträcka sig först i den ena, sedan den andra riktningen, eller diagonalt över slangens tvär- och längdriktning. Även vibrationer kommer effektivt att dämpas på önskat vis, då väggdelspartiets vibrationsrörelse upptas av expansionspartiet. Väggdelpartiet, och därmed slangen, kan därmed styras på önskat vis även vid vibrationer.

Väggdel- och expansionspartierna kan om så önskas ha olika utformning i olika delar längs slangen för att vid expansion eller vibration av slangen styra de olika delarnas rörelseriktning på önskat vis. Väggdel- och expansionspartiernas inbördes förhållanden kan likaledes vara olika i olika delar längs slangen.

Vid en sådan slang som är förformad till en viss sträckning i längdriktningen, såsom ofta är fallet med

slangar avsedda för motorrum, är företrädesvis utformningen av, och de inbördes förhållandena mellan, vägg- och expansionspartierna i slangmanteln i varje del av slangen är anpassad till slangens förform i respektive del. En och samma förformade slang kan således med fördel vara försedd med olika utformning av expanderings- och väggdelpartier.

Expansionspartiet kan företrädesvis utgöras av en rilla i slangmanteln, då denna befinner sig i oexpanderat tillstånd. En sådan rilla är relativt enkel att utforma, genom ett utförande där expansionspartiet är bildat i enhet med väggdelspartiet. Dess expansionsförmåga kan dessutom styras med hjälp av utformningen av dess tvärsnitt.

Företrädesvis är rillan spiralformigt vriden räknat i slangens längdriktning. Spiralformen innebär direkt att expansionspartiet är riktat både i slangens tvär- och längdriktning. Tryck och stötar i bägge riktningarna tas därför effektivt upp av slangen.

Den spiralformade rillans antal varv per längdenhet av slangen kan varieras för önskad styrning av slangen. Den kan även ha har olika vridningsriktning i olika delar av slangen, eller olika tvärsnittsutformning i olika delar av slangen. Variationsmöjligheterna är således många.

Företrädesvis har slangen ett eller flera expansionspartier, vilka är fördelade längs slangmantelns omkrets, för en god fördelning av tryck- och/eller stötutjämningen i varje enskilt fall.

Uppfinningen avser även ett förfarande för tillverkning av en slang enligt uppfinningen, varvid slangmaterialet strängsprutas. Förutom slangmaterialet och tillsammans med detta strängsprutas ett formmaterial (6), vilket är utformat för att bilda förform åt slangmaterialet för önskad konfiguration av expansionspartier och väggdelspartier. Denna förform tjänar till att underlätta strängsprutningsförfarandet. Då

slangmaterialet, före uppblåsning, har en relativt liten diameter, föreligger stor risk för att delar av slangen fäster samman med varandra. Detta gäller särskilt expansionspartierna, vars dimensioner i oupplåst skick är relativt små. Av formmaterialet (6) bildas vid strängsprutningen en stödform med expansions- och väggdelar, vilken förhindrar problem med formning av slangmaterialet.

Formmaterialet är lämpligen anordnat vid slangmaterialets yttre periferi, vilket ger praktiska fördelar vid förfarandet.

Företrädesvis är formmatieralet ansamlat i de partier av slangmaterialet som är avsett att bilda expansionspartier. Dessa partier utgör vanligen formade partier som exempelvis rillor. Den buktform som krävs av slangen skapas därvid genom en upphöjning i form-materialet, alltså ett tjockare parti av formmaterial.

Formmaterialet kan med fördel utgöras av ett elastiskt material, vilket sträcker sig kring slangmaterialets periferi. Formmaterialet i den färdiga slangen kommer då att vara anordnat kring slang-materialets periferi och åstadkommer en slät ytteryta för slangen. Elasticiteten i materialet tjänar till att möjliggöra att expansionspartierna fortfarande skall kunna anta ett oexpanderat och ett expanderat läge. En slät ytteryta kring slangen är en fördel, då den är lättare att hålla ren än en slang med exponerade expansionspartier. Slangen är då kring sin omkrets försedd med ett elastiskt material.

Kort beskrivning av ritningarna

Fig 1 visar en utföringsform av en slang enligt uppfinningen.

Fig 2 visar ett tvärsnitt längs linjen II-II av slangen i fig 1.

Fig 3 visar ett tvärsnitt längs linjen III-III av slangen i fig 1.

Fig 4 visar en andra utföringsform av en slang enligt uppfinningen.

Fig 5 visar ett tvärsnitt längs linjen V-V av slangen i fig 4.

Fig 6 visar ett tvärsnitt längs linjen VI-VI av slangen i fig 4.

Fig 7 visar en tredje utföringsform av en slang enligt uppfinningen.

Fig 8 visar ett tvärsnitt längs linjen VII-VII av slangen i fig 7.

Fig 9 visar ett tvärsnitt av ytterligare en utföringsform av en slang enligt uppfinningen.

Beskrivning av föredragna utföringsformer

I fig 1 visas en föredragen utföringsform av en slang enligt uppfinningen. Slangen är förformad med ett flertal krökar 1, 2 och ett rakare mittparti 3. Slangens mantelyta är försedd med rillor 4, vilka sträcker sig längs slangen. I den första krökta delen 1 av slangen är rillorna 4 vridna i spiral i riktning längs slangen. I detta parti 1 kan stötar såväl som tryck tas upp i flera riktningar. I det andra, raka 3 partiet av slangen är spiralens varv per längdenhet betydligt mindre, så liten att rillan 4 sträcker sig väsentligen utmed slangen. Vid mitten av det raka partiet 3 byter rillspiralen 4 riktning kring slangen för att i denna nya rikting återigen bilda en spiral med ett högre antal varv per längdenhet i den sista, utsvängda delen 2 av slangen.

Slangens tvärsnitt visas i fig 2. Här ses rillornas 4 tvärsnittsutformning som väsentligen rektangulär. Fyra rillor 4 är anordnande jämt fördelade längs slangens omkrets med väggdelpartier 5 däremellan. Vid ett av ändpartierna av slangen är denna slät och utan rillor 4, såsom visas i fig 3.

I fig 4 visas en annan utföringsform av en slang enligt uppfinningen. Rillornas 4 spiralform är

väsentligen lik den för slangen i fig 1. Rillornas 4 tvärsnittsform är däremot annorlunda, vilket framgår av fig 5. Rillorna 4 bildar här en spetsigare vinkel mot väggdelpartierna 5 och mellan rillans egna väggar. Denna utformning kan, om den är utförd i samma material som utföringsformen i fig 1, uppta större tryck och vibrationer än utföringsformen i fig 1, på grund av att rillorna har större expansionsförmåga.

I fig 7-8 visas en slang enligt uppfinningen vilken är försedd med ett elastiskt formmaterial kring sin periferi. Formmaterialet tjänar under tillverkning av slangen medelst strängsprutning till att ge slangen den önskade formen med expansions- och väggpartier. I denna utföringsform har ett elastiskt formmaterial använts, vilket är fast anordnat vid slangen och åstadkommer en slät yta. Den släta ytan kan vara fördelaktig för att skydda slangen mot nedsmutsning. Det elastiska materialet hindrar dock inte den relativa rörligheten mellan partierna nämnvärt. Det är även möjligt att använda ett formmaterial vilket tvättas bort då slangen är färdig. Ett sådant formmaterial skulle endast användas vid strängsprutningen och därefter avlägsnas från slangen. Slutresultatet blir då en slang enligt exempelvis fig 1-3.

Det är också möjligt att placera ett elastiskt material kring slangens inre periferi. Detta ger samma tillverkningsmässiga fördelar som de vilka nämnts ovan, och ger även slangen en slät insida, vilket eventuellt kan vara fördelaktigt för flödet genom slangen. Tvärsnittet genom en sådan utföringsform av en slang enligt uppfinningen visas i fig 9.

Många utföringsformer utöver de här visade är naturligtvis möjliga. Slangarnas liksom rillornas 4 former kan varieras på många sätt. I stället för rillor kan expansionspartierna vara utförda på något annat vis, förutsatt att tillräcklig expansionsförmåga erhålls. Exempelvis kan expansionspartierna 4 vara tillverkade av

ett elastiskt material vilket är sammansatt med väggdelspartierna 5 eller av ett försvagat område, som genom sin tunnare väggtjocklek blir mer elastiskt än de omgivande väggdelspartierna 5. Genom att variera ovanstående olika parametrar kan således slangpartierna fås att förskjutas i önskad riktning vid trycksättning eller vibrationer. Givetvis kan även slangens förform ha en annan utformning, beroende på slangens ändamål. Det skall även noteras att en slang enligt uppfinningen tack vare expansionspartierna kan fås flexibel. Även flexibilitetens riktning är då beroende av expansionspartiernas 4 och väggdelpartiernas 5 inbördes förhållande.

Man kan även tänka sig att slangar enligt uppfinningen är försedda med vissa delar som är helt utan vibrationsupptagande anordningar.

Även om de ovan beskrivna utföringsformerna utgör slangar med varierande vridningsriktning för rillan i olika delar av slangen, är det möjligt att ha samma vridningsriktning längs hela slangen. Tvärsnittsutformningen kan likaledes vara varierande eller konstant längs slangen, beroende på det enskilda fallets krav. Slangen kan ha ett eller flera expansionspartier, vilka kan vara jämnt eller oregelbundet anordnade.

Man kan även tänka sig slangar där ett elastiskt material är anordnat både på slangens yttre och dess inre periferi. Anordnandet av elastiskt material kan därvid optimeras både för tillverkning av slangen, för flöde genom densamma samt för rengöring. Rillornas inverkan på flödet genom slangen kan eventuellt utnyttjas för att styra detsamma.

PATENTKRAV

1. Mediumupptagande slang, företrädesvis för tryckmedium och för användning i exempelvis motorrum, varvid slangens vägg innefattar åtminstone ett väggdelparti (5), vilket är sammanbundet med åtminstone ett expansionsparti (4) för att bilda en kontinuerlig slangmantel, så att slangens omkrets är varierbar mellan ett minsta värde, då expansionspartiet (4)är oexpanderat, och ett största värde, då expansionspartiet (4) är maximalt expanderat, k ä n n e t e c k n a d a v att sagda expansionsparti (4) sträcker sig i slangens tvär- och längdriktning, varvid, när omkretsen ökar och expansionspartiet (4) expanderar, väggdelpartierna (5) förskjuts relativt varandra både i slangens tvär- och längdriktning.

2. Mediumupptagande slang enligt krav 1, k ä n n e t e c k n a d a v att väggdel- och expansionspartierna (5, 4) har olika utformning i olika delar (1, 2, 3) längs slangen för att vid expansion eller vibration av slangen styra de olika delarnas (1, 2, 3) rörelseriktning på önskat vis.

3. Mediumupptagande slang enligt krav 1 eller 2, k ä n n e t e c k n a d a v att väggdel- och expansionspartiernas (5, 4) inbördes förhållanden är olika i olika delar längs slangen (1, 2, 3), för att vid expansion av slangen styra de olika delarnas (1, 2, 3) rörelseriktning på önskat vis.

4. Mediumupptagande slang enligt något av kraven 1-3, k ä n n e t e c k n a d a v att slangen är förformad till en viss sträckning i längdriktningen och att utformningen av, och de inbördes förhållandena mellan, väggdel- och expansionspartierna (5, 4) i slangmanteln i varje del av slangen är anpassad till slangens förform i respektive del (1, 2, 3) av slangen.

5. Mediumupptagande slang enligt något av kraven 1-4, k ä n n e t e c k n a d a v att expansionspartiet utgörs av en rilla i slangmanteln, då denna befinner sig i oexpanderat tillstånd.

6. Mediumupptagande slang enligt krav 5, k ä n n e t e c k n a d a v att rillan är spiralformigt vriden räknat i slangens längdriktning.

7. Mediumupptagande slang enligt krav 6, k ä n n e t e c k n a d a v att den spiralformiga rillan har ett varierande antal varv per längdenhet av slangen.

8. Mediumupptagande slang enligt något av kraven 6-7, k ä n n e t e c k n a d a v att den spiralformiga rillan har olika vridningsriktning i olika delar av slangen.

9. Mediumupptagande slang enligt något av kraven 6-8, k ä n n e t e c k n a d a v att rillans tvärsnittsutformning är olika i olika delar av slangen.

10. Mediumupptagande slang enligt något av kraven 1-9, k ä n n e t e c k n a d a v att slangen har minst två expansionspartier, vilka är jämt fördelade längs slangmantelns omkrets.

11. Mediumupptagande slang enligt något av kraven 1-10, k ä n n e t e c k n a d a v att slangen har fyra väggdelpartier förutom fyra expansionspartier vilka är växelvis anordnade längs slangmantelns omkrets.

12. Förfarande för tillverkning av en slang enligt krav 1, varvid slangmaterialet strängsprutas, k ä n n e t e c k n a t a v att förutom slangmaterialet och tillsammans med detta strängsprutas ett formmaterial, vilket är utformat för att bilda förform åt slangmaterialet för önskad konfiguration av expansionspartier och väggdelspartier.

13. Förfarande enligt krav 12, varvid formmaterialet är anordnat vid slangmaterialets yttre periferi.

14. Förfarande enligt något av kraven 12 eller 13, varvid formmatieralet är ansamlat i de partier av slangmaterialet som är avsett att bilda expansionspartier.

15. Förfarande enligt något av kraven 12-14, varvid formmaterialet utgörs av ett elastiskt material, vilket sträcker sig kring slangmaterialets periferi.

16. Förfarande enligt krav 15, varvid formmaterialet i den färdiga slangen är anordnad kring slangmaterialets periferi och åstadkommer en slät ytteryta för slangen.

17. Förfarande enligt något av kraven 12-15, varvid formmaterialet avlägsnas från slangmaterialet för bildande av den färdiga slangen.

18. Förfarande enligt krav 17, varvid formmaterialet har egenskapen att det kan tvättas bort från slangmaterialet.

19. Slang enligt något av kraven 1-11, varvid slangen kring sin omkrets är försedd med ett elastiskt material.

20. Slang enligt något av kraven 1-11, varvid slangen kring sin inre periferi är försedd med ett elastiskt material.

## SAMMANFATTNING

Föreliggande uppfinning avser en mediumupptagande slang, företrädesvis för tryckmedium och för användning i till exempel en motorenhet, varvid slangens vägg innefattar åtminstone ett väggdelparti (5). Väggdelpartiet (5) är sammanbundet med åtminstone ett expansionsparti (4) för att bilda en kontinuerlig slangmantel, så att slangens omkrets är varierbar mellan ett minsta värde, då expansionspartiet (4) är oexpanderat, och ett största värde, då expansionspartiet (4) är maximalt expanderat. Sagda expansionsparti (4) sträcker sig i slangens tvär- och längdriktning, varvid, när omkretsen ökar och expansionspartiet (4) expanderar, väggdelpartierna (5) förskjuts relativt varandra både i slangens tvär- och längdriktning.

Uppfinningen avser även ett förfarande för tillverkning av en sådan slang.

Publiceringsbild: fig 1

PATENT
0104-0374P

IN THE U.S. PATENT AND TRADEMARK OFFICE

| | | | |
|---|---|---|---|
| Applicant: | RYHMAN, Morgan | Conf.: | |
| Appl. No.: | New | Group: | |
| Filed: | December 28, 2001 | Examiner: | |
| For: | HOSE | | |

LETTER

Assistant Commissioner for Patents
Washington, DC 20231

December 28, 2001

Sir:

The PTO is requested to use the amended sheets/claims attached hereto *(which correspond to Article 19 amendments or to claims attached to the International Preliminary Examination Report (Article 34))* during prosecution of the above-identified national phase PCT application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By _____
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0104-0374P

Attachments

(Rev. 11/15/01)

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

| Applicant's or agent's file reference PC-2006531 | FOR FURTHER ACTION | See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |
|---|---|---|
| International application No. PCT/SE00/01163 | International filing date *(day/month/year)* 06.06.2000 | Priority date *(day/month/year)* 29.06.1999 |
| International Patent Classification (IPC) or national classification and IPC7 F16L 11/12 | | |
| Applicant ABA of Sweden AB et al | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

| Date of submission of the demand | Date of completion of this report |
|---|---|
| 16.01.2001 | 11.07.2001 |
| Name and mailing address of the IPEA/SE<br>Patent- och registreringsverket<br>Box 5055<br>S-102 42 STOCKHOLM<br>Facsimile No. 08-667 72 88 | Authorized officer<br>Axel Lindhult / JA A<br>Telephone No. 08-782 25 00 |

Telex 17978 PATOREG-S

Form PCT/IPEA/409 (cover sheet) (January 1998)

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE00/01163

## I. Basis f the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed

☒ the description:
pages 1-7 , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☒ the claims:
pages _____ , as originally filed
pages _____ , as amended (together with any statement) under article 19
pages _____ , filed with the demand
pages 9-12 , filed with the letter of 04.07.2001

☒ the drawings:
pages 1-3 , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☐ the sequence listing part of the description:
pages _____ , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language english which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☒ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheet/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE00/01163

**V. Reasoned statement under Article 35(2) with regard t novelty, inventive step r industrial applicability; citations and explanations supporting such statement**

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Claims | 1-19 | YES |
| | Claims | | NO |
| Inventive step (IS) | Claims | 1-19 | YES |
| | Claims | | NO |
| Industrial applicability (IA) | Claims | 1-19 | YES |
| | Claims | | NO |

2. Citations and explanations (Rule 70.7)

D1: SE 368449 B
D2: SE 403564 B
D3: US 3050087 A
D4: US 3318335 A
D5: US 5397157 A

The invention relates to a medium-carrying hose, preferably for pressure medium and for use in, for example, engine compartments. The invention also relates to a method for manufacturing such a hose.

One problem with a hose assembled in an engine compartment is that the hose, when pressurised, tends to move or bulge in the engine compartment. The hose may then abut against other parts of the engine body, which for instance because of their temperature may damage the hose.

The object of the invention is to solve said problem by a hose provided with expansion portions extending in the transverse and the longitudinal direction of the hose. The direction of motion of the portions during pressurising can thus be controlled, so that there is no risk of the hose touching other components in, for example, an engine unit.

The principal cited document D3 (refer to figures 1 and 3) discloses a medium-carrying hose, that has a wall portion 30 which is connected with expansion portions (the parts between the corrugations 31) to form a continuous hose casing. The circumference of the expansion portions must be variable. Said expansion portions extend in the transverse and the longitudinal direction of the hose (refer to fig. 1). Wall portions must be displaced relative to each other in the transverse as well as the longitudinal direction of the hose as the circumference increases and the expansion portions expand.

.../...

**Supplemental Box**
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V.

In comparison, the hose described in claim 1 of the present invention differs from the hoses according to the cited documents in that the wall and expansion portions "...are differently formed in different parts (1, 2, 3) along the hose in order to control, during expansion or vibration of the hose, the direction of motion of the different parts (1, 2, 3) in a desirable manner."

The method of manufacturing the hose according to claim 1 and described in claim 13 differs from the cited methods "...by extruding, in addition to the hose material and together with this, a form material, which is adapted to be a preform for the hose material for the desired configuration of the expansion portions and wall portions."

Consequently, the medium-carrying hose and the method according to claims 1 and 13 fulfil the requirement of novelty according to PCT Article 33(2).

It would not be obvious to a person skilled in art to apply the features from the cited documents and thus arrive at a hose and a method as stated in claims 1 and 13. Therefore, the subject matter of these claims fulfils the requirement of inventive step according to PCT Article 33(3).

Claims 1 and 13 also fulfil the requirement of industrial applicability according to PCT Article 33(4).

Dependent claims 2-12 and 14-19 disclose further features of the invention according to claims 1 and 13, and fulfil the requirements of novelty, inventive step and industrial applicability according to PCT Article 33(2,3,4).

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
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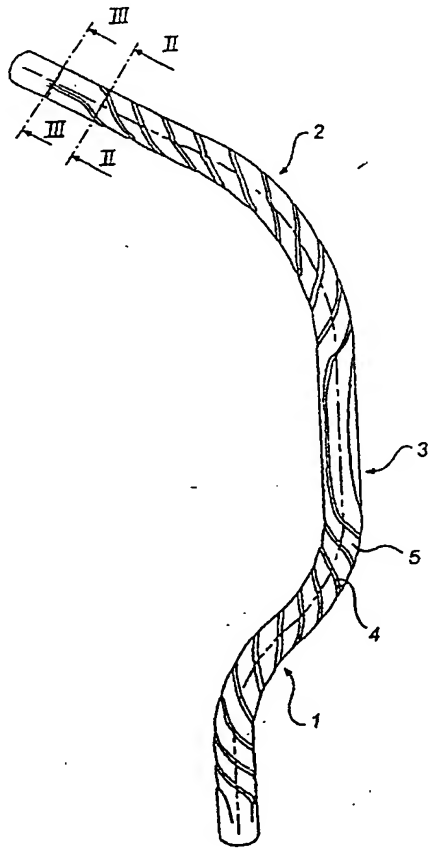
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KR (utility model), KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

*[Continued on next page]*

(54) Title: HOSE




(57) Abstract: The present invention relates to a medium-carrying hose, preferably for pressure medium and for use in, for instance, an engine unit, the wall of the hose comprising at least one wall portion (5). The wall portion (5) is connected with at least one expansion portion (4) to form a continuous hose casing, so that the circumference of the hose is variable between a minimum value, when the expansion portion (4) is unexpanded, and a maximum value, when the expansion portion (4) is maximally expanded. The expansion portion (4) extends in the transverse and the longitudinal direction of the hose, the wall portions (5) being displaced relative to each other both in the transverse and in the longitudinal direction of the hose as the circumference increases and the expansion portion (4) expands. The invention also relates to a method for manufacturing such a hose.

WO 01/01029 A1

(84) **Designated States** *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

**Published:**
— *With international search report.*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# HOSE

## Field of the Invention

The present invention relates to a medium-carrying hose, preferably for pressure medium and for use in e.g. engine compartments, the wall of the hose comprising at least one wall portion which is connected with at least one expansion portion to form a continuous hose casing. The circumference of the hose is variable between a minimum value, when the expansion portion is unexpanded, and a maximum value, when the expansion portion is maximally expanded.

The invention also relates to a method for manufacturing such a hose.

## Background Art

Hoses of the type that is used in engine compartments are subjected to various effects of the surroundings. For instance, they can be subjected to pressure, from inside or from outside, or to relatively powerful vibrations as the engine is running. The space for hoses in motor compartments and the like is usually very limited. For an engine unit to be compact in terms of space, it is often necessary that the hoses be preformed and bent in given directions to fit between the other components of the engine. However there is one problem since the hose, when pressurised, tends to move or bulge in the engine compartment. The hose may then abut against other parts of the engine body, which for instance because of their temperature may damage the hose. This situation may also arise if the hose vibrates in the operation of the engine. Both pressurising and vibration besides cause a strain to the attachment of the hose in the engine unit.

There are today a plurality of hoses which have some kind of bellows structure at their ends, thereby reducing the vibrations in the attachment of the hose. However,

such bellow structures do not affect the motion of the various parts of the hose, which are still essentially free and can abut against neighbouring objects.

Such a hose is disclosed in e.g. EP 0 791 775, where flexible portions at the ends of the hose are combined with a rigid hose portion in the middle of the hose. Vibrations are absorbed in the longitudinal direction of the hose at the hose ends, but otherwise the hose is allowed to move freely.

## Summary of the Invention

According to the invention the above problems are solved by a hose of the type mentioned by way of introduction, the expansion portion of the tube extending in the transverse and the longitudinal direction of the hose, the wall portions being displaced relative to each other in the transverse as well as the longitudinal direction of the hose as the circumference increases and the expansion portion expands.

By the expansion portion extending in the transverse and the longitudinal direction of the hose, the wall portions will be displaced in the transverse as well as the longitudinal direction when, for instance, pressurising the hose. The direction of motion of the portions during pressurising can thus be controlled, so that there is no risk of the hose touching other components in, for example, an engine unit. The expansion portion can extend first in one then in other direction, or diagonally across the transverse and the longitudinal direction of the hose. Also vibrations will be efficiently damped in a desirable manner when the vibrating motion of the wall portion is absorbed by the expansion portion. This means that the wall portion, and thus the hose, can be controlled in a desirable manner also in case of vibrations.

The wall and expansion portions may, if desirable, be differently formed in different parts along the hose in order to control, during expansion or vibration of the

hose, the direction of motion of the different parts in a desirable manner. The relationships of the wall and expansion portions can also differ in different parts along the hose.

In such a hose, which is preformed to have a certain extent in the longitudinal direction, as is often the case of hoses intended for engine compartments, the design of, and the relationships of, the wall and expansion portions in the hose casing in each part of the hose is preferably adapted to the preform of the hose in the respective parts. One and the same preformed hose can thus advantageously be provided with differently formed expansion and wall portions.

Preferably the expansion portion may consist of a groove in the hose casing when this is in an unexpanded state. Such a groove is relatively easy to form by means of a design in which the expansion portion is formed in unity with the wall portion. The expansion of the groove can besides be controlled with the aid of the shape of its cross-section.

Preferably the groove is helically turned seen in the longitudinal direction of the hose. The helical shape means directly that the expansion portion is oriented both in the transverse and in the longitudinal direction of the hose. Pressure and shocks in both directions are therefore efficiently absorbed by the hose.

The number of turns of the helical groove per unit of length of the hose may be varied to control the hose as desired. The groove may also have different direction of turning in different parts of the hose, or different cross-sectional shape in different parts of the hose. This results in many possibilities of variation.

Preferably the hose has one or more expansion portions, which are distributed along the circumference of the hose casing, for satisfactory distribution of the pressure and/or shock equalisation in each individual case.

The invention also relates to a method for manufacturing a hose according to the invention, in which the hose material is extruded. In addition to the hose material and together with this, a form material is extruded which is adapted to be a preform for the hose material for the desired configuration of expansion portions and wall portions. This preform serves to facilitate the process of extrusion. When the hose material, before blowing, has a relatively small diameter, there is a great risk that parts of the hose adhere to each other. This concerns in particular the expansion portions whose dimensions in the non-blown state are relatively small. A supporting form with expansion and wall portions is formed of the form material during extrusion and prevents problems in the forming of the hose material.

The form material is suitably arranged along the outer circumference of the hose material, which gives practical advantages in the method.

Preferably the form material is accumulated in the portions of the hose material which are intended to form expansion portions. These portions usually constitute formed portions such as grooves. The bulging shape which is necessary for the hose is produced by means of an elevated portion in the form material, thus a thicker portion of form material.

The form material can advantageously consist of an elastic material which extends along the circumference of the hose material. The form material of the completed hose will then be arranged along the circumference of the hose material and provides a smooth outer face for the hose. The elasticity of the material serves to make it possible for the expansion portions still to assume an unexpanded and an expanded state. A smooth outer face round the hose is advantageous since it is easier to keep clean than a hose with exposed expansion portions. The hose is then along its circumference provided with an elastic material.

Brief Description of the Drawings

Fig. 1 shows an embodiment of a hose according to the invention.

Fig. 2 is a cross-sectional view along line II-II of the hose in Fig. 1.

Fig. 3 is a cross-sectional view along line III-III of the hose in Fig. 1.

Fig. 4 shows a second embodiment of a hose according to the invention.

Fig. 5 is a cross-sectional view along line V-V of the hose in Fig. 4.

Fig. 6 is a cross-sectional view along line VI-VI of the hose in Fig. 4.

Fig. 7 shows a third embodiment of a hose according to the invention.

Fig. 8 is a cross-sectional view along line VII-VII of the hose in Fig. 7.

Fig. 9 is a cross-sectional view of one more embodiment of a hose according to the invention.

Description of Preferred Embodiments

Fig. 1 illustrates a preferred embodiment of a hose according to the invention. The hose is preformed with a plurality of bends 1, 2 and a straight central portion 3. The circumferential surface of the hose is formed with grooves 4 which extend along the hose. In the first bent part 1 of the hose, the grooves 4 are helically turned along the hose. In this portion 1, shocks as well as pressure can be absorbed in several directions. In the second straight portion 3 of the hose, the number of turns of the helix per unit of length is considerably smaller, i.e. so small that the groove 4 extends essentially along the hose. In the middle of the straight portion 3, the helical groove 4 changes direction round the hose in order to form in this new direction a helix having a larger number of turns per unit of length in the last, bent part 2 of the hose.

The cross-section of the hose is shown in Fig. 2. Here the cross-sectional shape of the grooves 4 is essentially rectangular. Four grooves 4 are uniformly distributed along the circumference of the hose with wall portions 5 therebetween. In one of the end portions of the hose, the hose is smooth and without grooves 4, as shown in Fig. 3.

Fig. 4 shows another embodiment of a hose according to the invention. The helical shape of the grooves 4 is similar to that of the hose in Fig. 1. The cross-sectional shape of the grooves 4, however, is different, which is evident from Fig. 5. Here the grooves 4 form a more acute angle to the wall portions 5 and between the walls of the groove. This design can, if it is made of the same material as in the embodiment in Fig. 1, absorb greater pressure and more powerful vibrations than in the embodiment in Fig. 1 owing to the greater expansibility of the grooves.

Figs 7-8 show a hose according to the invention, which is provided with an elastic form material along its circumference. In the manufacture of the hose by extrusion, the form material serves to give the hose the desired form with expansion and wall portions. In this embodiment an elastic form material is used, which is fixedly arranged on the hose and provides a smooth surface. The smooth surface can be advantageous to protect the hose from dirt. The elastic material, however, does not significantly prevent the relative movability between the portions. It is also possible to use a form material which is washed away after the hose is completed. Such a form material would then be used only in the extrusion and then be removed from the hose. The final result will then be a hose according to, for example, Figs 1-3.

It is also possible to arrange an electric material along the inner circumference of the hose. This yields the same advantages in terms of manufacture as those mentioned above, and also gives the hose a smooth inside,

which may be advantageous for the flow through the hose. The cross-section of such an embodiment of a hose according to the invention is shown in Fig. 9.

It goes without saying that many embodiments in addition to those described above are feasible. The shapes of the hoses and the grooves 4 can be varied in many ways. Instead of having grooves, the expansion portions can be designed in some other fashion, provided that efficient expansibility is obtained. For instance, the expansion portions 4 can be made of an elastic material which is put together with the wall portions 5, or of a weakened area which owing to its thinner wall thickness will be more elastic than the surrounding wall portions 5. By varying the above different parameters, the hose portions can thus be made to be displaced in the desired direction in pressurising or in case of vibrations. Of course, the preform of the hose can also be of a different design, according to the purpose of the hose. It should also be noted that a hose according to the invention, thanks to the expansion portions, can be made flexible. Also the direction of the flexibility is then dependent on the relationship of the expansion portions 4 and the wall portions 5.

Hoses according to the invention may also be provided with certain parts without any vibration-absorbing arrangements whatever.

Although the embodiments described above constitute hoses with a groove having a varying direction of turning in different parts of the hose, it is possible to have the same direction of turning along the entire hose. The cross-sectional shape may also be varied or constant along the hose, according to the requirements in the individual case. The hose can have one or more expansion portions, which can be uniformly or irregularly arranged.

It is also possible to have hoses where an elastic material is arranged both on the outer and on the inner circumference of the hose. The arrangement of elastic

material can be optimised for manufacture of the hose, for the flow therethrough as well as for cleaning. The effect of the grooves on the flow through the hose can optionally be used to control the flow.

CLAIMS

1. A medium-carrying hose, preferably for pressure medium and for use in e.g. engine compartments, the wall of the hose comprising at least one wall portion (5) which is connected with at least one expansion portion (4) to form a continuous hose casing, so that the circumference of the hose is variable between a minimum value, when the expansion portion (4) is unexpanded, and a maximum value, when the expansion portion (4) is maximally expanded, c h a r a c t e r i s e d in that said expansion portion (4) extends in the transverse and the longitudinal direction of the hose, the wall portions (5) being displaced relative to each other in the transverse as well as the longitudinal direction of the hose as the circumference increases and the expansion portion (4) expands.

2. A medium-carrying hose according to claim 1, c h a r a c t e r i s e d in that the wall and expansion portions (5, 4) are differently formed in different parts (1, 2, 3) along the hose in order to control, during expansion or vibration of the hose, the direction of motion of the different parts (1, 2, 3) in a desirable manner.

3. A medium-carrying hose according to claim 1 or 2, c h a r a c t e r i s e d in that the relationships of the wall and expansion portions (5, 4) are different in different parts along the hose (1, 2, 3) in order to control, during expansion of the hose, the direction of motion of the different parts (1, 2, 3) in a desirable manner.

4. A medium-carrying hose according to any one of claims 1-3, c h a r a c t e r i s e d in that the hose is preformed to have a certain extent in the longitudinal direction, and that the design of, and the relationships of, the wall and expansion portions (5, 4) in the hose

casing in each part of the hose is adapted to the preform of the hose in the respective parts (1, 2, 3) of the hose.

5. A medium-carrying hose according to any one of claims 1-4, c h a r a c t e r i s e d in that the expansion portion is a groove in the hose casing when this is in an unexpanded state.

6. A medium-carrying hose according to claim 5, c h a r a c t e r i s e d in that the groove is helically turned seen in the longitudinal direction of the hose.

7. A medium-carrying hose according to claim 6, c h a r a c t e r i s e d in that the helical groove has a varying number of turns per unit of length of the hose.

8. A medium-carrying hose according to claim 6 or 7, c h a r a c t e r i s e d in that the helical groove has different direction of turning in different parts of the hose.

9. A medium-carrying hose according to any one of claims 6-8, c h a r a c t e r i s e d in that the cross-sectional shape of the groove is different in different parts of the hose.

10. A medium-carrying hose according to any one of claims 1-9, c h a r a c t e r i s e d in that the hose has at least two expansion portions, which are uniformly distributed along the circumference of the hose casing.

11. A medium-carrying hose according to any one of claims 1-10, c h a r a c t e r i s e d in that the hose has four wall portions in addition to four expansion portions which are alternatingly arranged along the circumference of the hose casing.

12. A method for manufacturing a hose according to claim 1, the hose material being extruded, c h a r a c t e r i s e d by extruding, in addition to the hose material and together with this, a form material, which is adapted to be a preform for the hose material for the desired configuration of expansion portions and wall portions.

13. A method according to claim 12, wherein the form material is arranged along the outer circumference of the hose material.

14. A method according to claim 12 or 13, wherein the form material is accumulated in the portions of the hose material which are adapted to form expansion portions.

15. A method according to any one of claims 12-14, wherein the form material is an elastic material which extends along the circumference of the hose material.

16. A method according to claim 15, wherein the form material in the completed hose is arranged along the circumference of the hose material and provides a smooth outer face for the hose.

17. A method according to any one of claims 12-15, wherein the form material is removed from the hose material in order to form the completed hose.

18. A method according to claim 17, wherein the form material has the property that it can be washed away from the hose material.

19. A hose according to any one of claims 1-11, wherein the hose along its circumference is provided with an elastic material.

20. A hose according to any one of claims 1-11, wherein the hose along its inner circumference is provided with an elastic material.

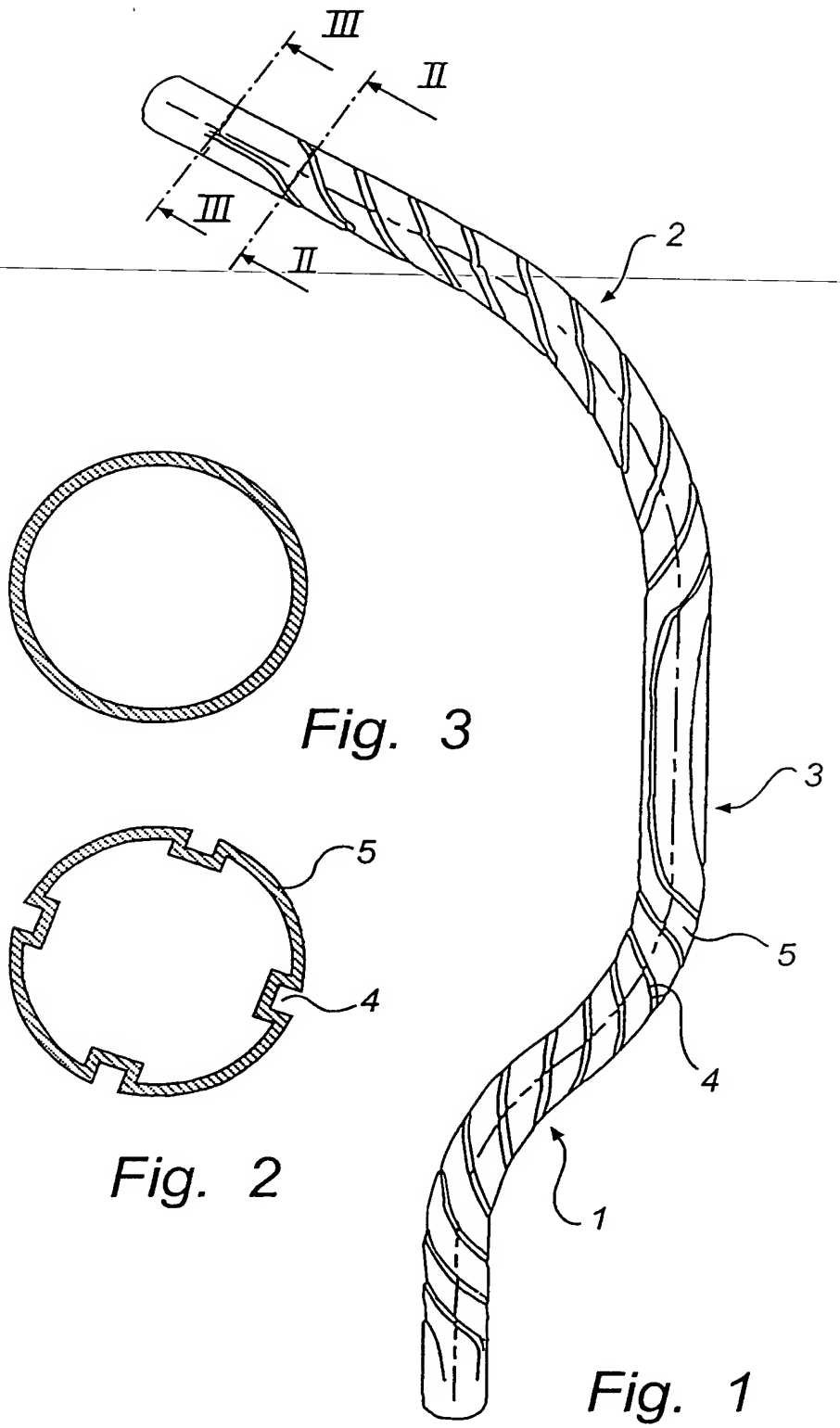



Fig. 1



Fig. 3




Fig. 2

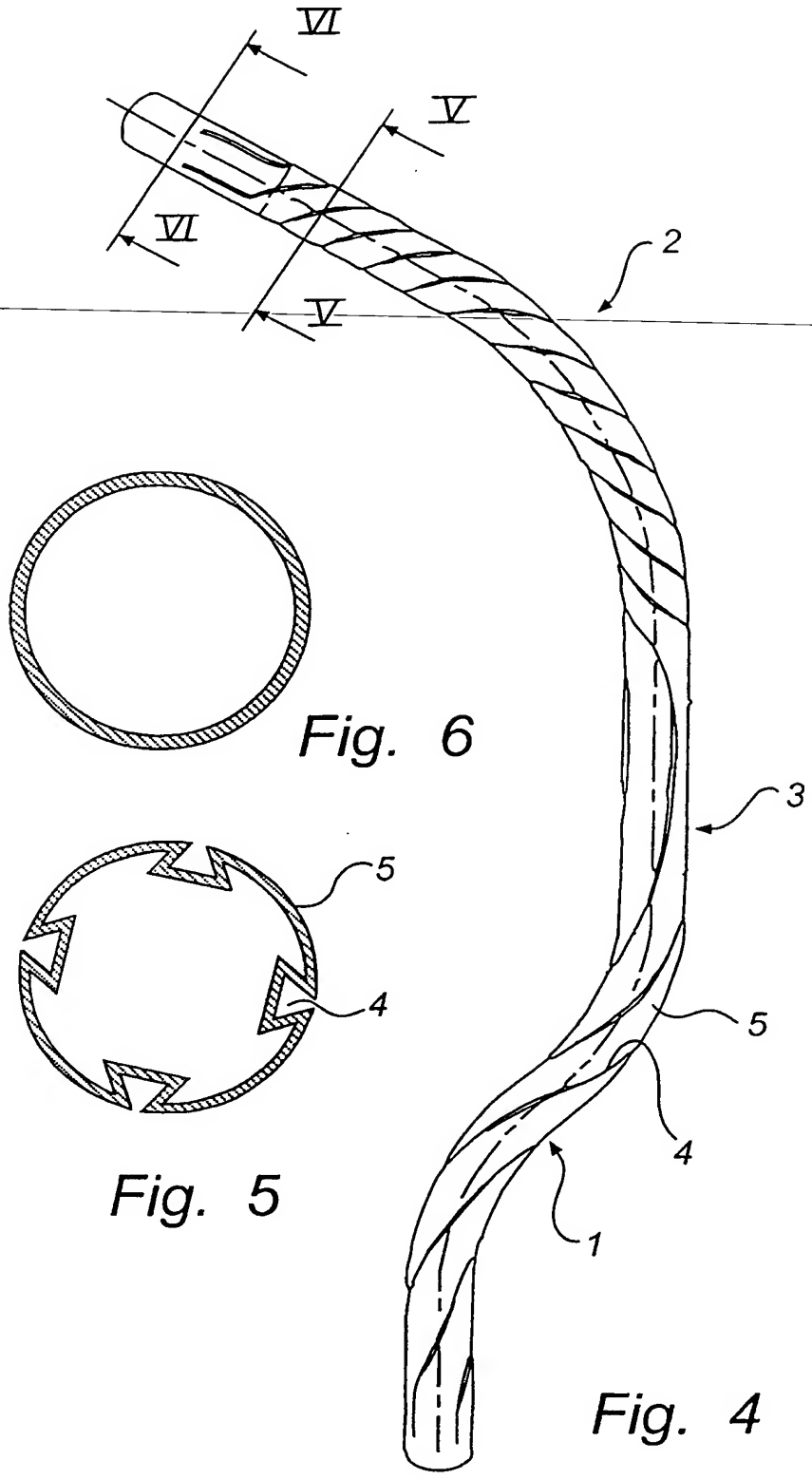



Fig. 4



Fig. 6




Fig. 5

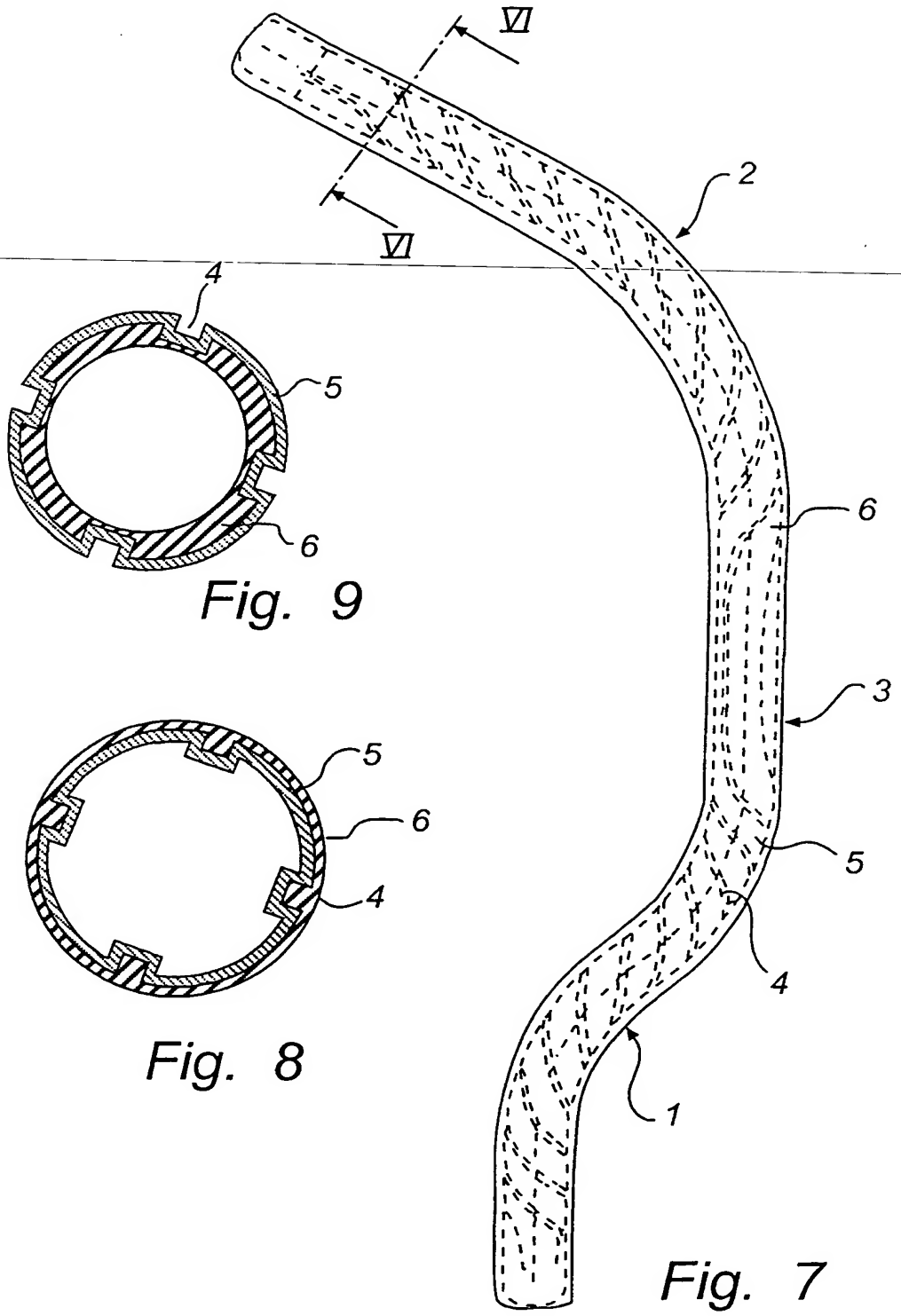



Fig. 7




Fig. 8




Fig. 9

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/01163

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: F16L 11/12
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | SE 368449 B (FRANKISCHE ISOLIERROHR- U. METALLWAREN-WERKE GEBR. KIRCHNER), 1 July 1974 (01.07.74), figure 3 -- | 1,5,6 |
| X | US 3050087 A (D.M. CAPLAN), 21 August 1962 (21.08.62), figures 1-3 -- | 1,5,6 |
| X | US 3318335 A (C.M. HELLER), 9 May 1967 (09.05.67), figures 1-34 -- | 1,5,6,10 |
| X | US 5397157 A (HEMPEL ET AL), 14 March 1995 (14.03.95), figure 1 -- | 1,5,6 |

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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|---|---|
| 26 Sept 2000 | 13 -10- 2000 |
| Name and mailing address of the ISA/<br>Swedish Patent Office<br>Box 5055, S-102 42 STOCKHOLM<br>Facsimile No. +46 8 666 02 86 | Authorized officer<br>Axel Lindhult / MRo<br>Telephone No. +46 8 782 25 00 |

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/01163

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | SE 403564 B (AB ELECTROLUX), 28 August 1978 (28.08.78)<br><br>--<br>-------- | |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

01/08/00

International application No.
PCT/SE 00/01163

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| SE 368449 B | 01/07/74 | AU 466415 B | 30/10/75 |
| | | AU 3712671 A | 28/06/73 |
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| | | FR 2124718 A | 22/09/72 |
| | | GB 1370679 A | 16/10/74 |
| US 3050087 A | 21/08/62 | NONE | |
| US 3318335 A | 09/05/67 | NONE | |
| US 5397157 A | 14/03/95 | DE 4310510 A,C | 06/10/94 |
| | | JP 2766180 B | 18/06/98 |
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| | | DE 2705335 A | 18/08/77 |
| | | GB 1516612 A | 05/07/78 |
| | | SE 7601503 A | 12/08/77 |

CLAIMS

1. A medium-carrying hose, preferably for pressure medium and for use in e.g. engine compartments, the wall of the hose comprising at least one wall portion (5) which is connected with at least one expansion portion (4) to form a continuous hose casing, so that the circumference of the hose is variable between a minimum value, when the expansion portion (4) is unexpanded, and a maximum value, when the expansion portion (4) is maximally expanded, c h a r a c t e r i s e d in that said expansion portion (4) extends in the transverse and the longitudinal direction of the hose, the wall portions (5) being displaced relative to each other in the transverse as well as the longitudinal direction of the hose as the circumference increases and the expansion portion (4) expands.

2. A medium-carrying hose according to claim 1, c h a r a c t e r i s e d in that the wall and expansion portions (5, 4) are differently formed in different parts (1, 2, 3) along the hose in order to control, during expansion or vibration of the hose, the direction of motion of the different parts (1, 2, 3) in a desirable manner.

3. A medium-carrying hose according to claim 1 or 2, c h a r a c t e r i s e d in that the relationships of the wall and expansion portions (5, 4) are different in different parts along the hose (1, 2, 3) in order to control, during expansion of the hose, the direction of motion of the different parts (1, 2, 3) in a desirable manner.

4. A medium-carrying hose according to any one of claims 1-3, c h a r a c t e r i s e d in that the hose is preformed to have a certain extent in the longitudinal direction, and that the design of, and the relationships of, the wall and expansion portions (5, 4) in the hose

casing in each part of the hose is adapted to the preform of the hose in the respective parts (1, 2, 3) of the hose.

4 5. A medium-carrying hose according to any one of claims 1-4, c h a r a c t e r i s e d in that the expansion portion is a groove in the hose casing when this is in an unexpanded state.

5 6. A medium-carrying hose according to claim 5, c h a r a c t e r i s e d in that the groove is helically turned seen in the longitudinal direction of the hose.

6 7. A medium-carrying hose according to claim 6, c h a r a c t e r i s e d in that the helical groove has a varying number of turns per unit of length of the hose.

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19 ~~18~~. A method according to claim 17, wherein the form material has the property that it can be washed away from the hose material.

11 ~~19~~. A hose according to any one of claims 1-11, wherein the hose along its circumference is provided with an elastic material.

12 ~~20~~. A hose according to any one of claims 1-11, wherein the hose along its inner circumference is provided with an elastic material.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

# PCT

## NOTIFICATION OF ELECTION

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| | |
|---|---|
| **Date of mailing** (day/month/year)<br>26 February 2001 (26.02.01) | |
| **International application No.**<br>PCT/SE00/01163 | **Applicant's or agent's file reference**<br>2006531 |
| **International filing date** (day/month/year)<br>06 June 2000 (06.06.00) | **Priority date** (day/month/year)<br>29 June 1999 (29.06.99) |
| **Applicant**<br>RYHMAN, Morgan | |

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

16 January 2001 (16.01.01)

[ ] in a notice effecting later election filed with the International Bureau on:

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Telephone No.: (41-22) 338.83.38

Nummer: 27 05 335
Int. Cl.²: F 16 L 11/12
Anmeldetag: 9. Februar 1977
Offenlegungstag: 18. August 1977

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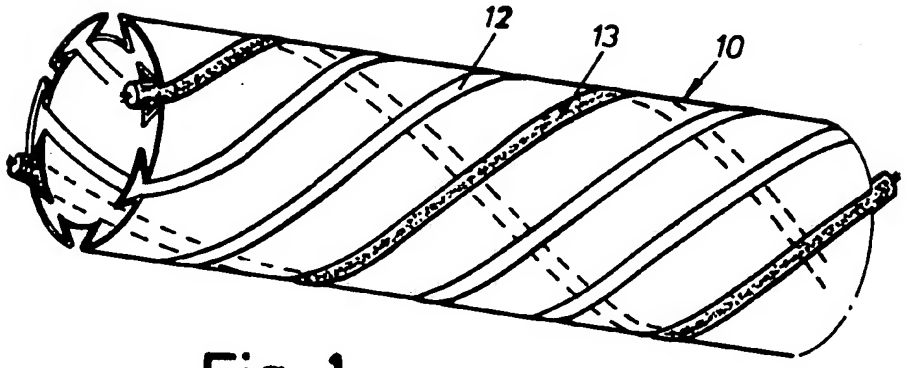


Fig. 1

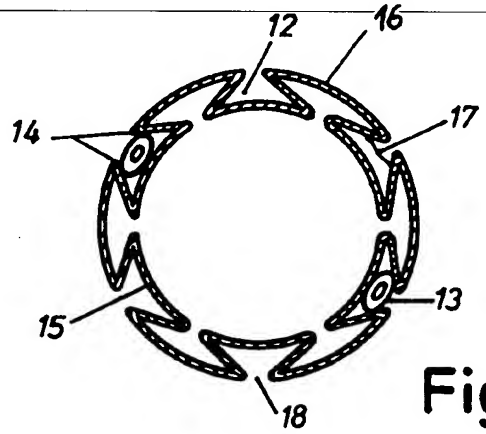


Fig. 2

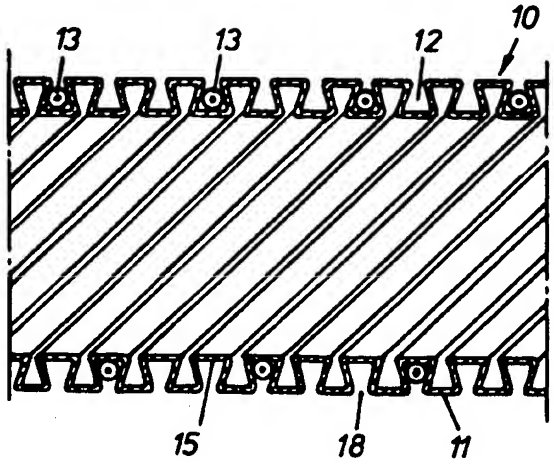


Fig. 3

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(54) Bezeichnung: Biegsamer Schlauch, insbesondere für Staubsauger

(71) Anmelder: AB Electrolux, Stockholm

(74) Vertreter: Beyer, W., Dipl.-Ing.; Jochem, B., Dipl.-Wirtsch.-Ing.; Pat.-Anwälte, 6000 Frankfurt

(72) Erfinder: Kilström, Lars Gunnar, Täby (Schweden)

DT 27 05 335 A 1

8. 77 709 833/648 4/70

## Patentansprüche

1. Biegsamer Schlauch mit einer oder mehreren Nuten zur Aufnahme elektrischer Leiter, insbesondere für Staubsauger, d a d u r c h g e k e n n z e i c h n e t , daß die Nuten (12) als schraubengangförmige, nach außen offene Schwalbenschwanznuten ausgebildet sind.

2. Schlauch nach Anspruch 1, d a d u r c h g e k e n n z e i c h n e t , daß der Öffnungsspalt (18) der Schwalbenschwanznuten (12) etwas kleiner ist als die Dicke der elektrischen Leiter (13).

3. Schlauch nach Anspruch 1 oder 2, d a d u r c h g e k e n n z e i c h n e t , daß die zwischen dem Boden (15) der Nuten (12) und der äußeren Mantelfläche (16) gemessene Tiefe der Nuten etwas größer ist als die Dicke der elektrischen Leiter (13).

4. Schlauch nach einem der Ansprüche 1 bis 3, d a d u r c h g e k e n n z e i c h n e t , daß die Nuten (12) eine Steigung von 5 bis 1o cm haben.

5. Schlauch nach einem der Ansprüche 1 bis 4, d a d u r c h g e k e n n z e i c h n e t , daß mehrere parallele Nuten (12) vorgesehen sind.

6. Schlauch nach einem der Ansprüche 1 bis 5, d a d u r c h g e k e n n z e i c h n e t , daß der Schlauch in an sich bekannter Weise eine geflochtene Hülle hat.

Patentanwälte
Dipl.-Ing. W.Beyer
Dipl.-Wirtsch.-Ing. B.Jochem

Frankfurt am Main Staufenstrasse 36



In Sachen:

Aktiebolaget Electrolux
Luxbacken 1
S-105 45 Stockholm

# Biegsamer Schlauch, insbesondere für Staubsauger.

Die Erfindung betrifft einen biegsamen Schlauch mit einer oder mehreren Nuten zur Aufnahme elektrischer Leiter, insbesondere für Staubsauger.

Es ist bekannt, in einen biegsamen Schlauch einen oder mehrere elektrische Leiter einzulassen, um z.B. motorisch angetriebene Zusatzgeräte für Staubsauger, beispielsweise eine Walzenbürste, mit dem Staubsauger zu verbinden. Durch das Einbetten der elektrischen Leiter in den Schlauch wird die Handhabung des Staubsaugers erleichtert, da keine losen Kabel zwischen dem Staubsauger und dem Zusatzgerät herumhängen.

Zu dem genannten Zweck ist es bekannt, einen elektrischen Leiter im wesentlichen schraubengangförmig auf einen Schlauch mit einer weich nachgiebigen Außenschicht aufzuwickeln. Auf diese Weise wird der elektrische Leiter mehr oder weniger in das weich nachgi bige Mat rial eingebettet mit der Folg , daß der Schlauch dadurch verhältnis-

mäßig steif wird und dann schwer zu handhaben ist.

Alternativ ist vorgeschlagen worden, einen Schlauch aus mehreren Lagen zusammenzusetzen und den elektrischen Leiter in einer Nut in einer der Lagen unterzubringen. Der Schlauch ist in diesem Falle flexibler, da sich der elektrische Leiter in der Nut in einem gewissen Maße bewegen kann. Vor allem Beweglichkeit in axialer Richtung ist wichtig, damit die größte Spannung, die sich beim Biegen des Schlauchs ergibt, von diesem selbst und nicht vom elektrischen Leiter aufgenommen wird. Wenn dagegen die beim Biegen auftretenden Spannungen auf den elektrischen Leiter übertragen werden, wirkt sich dies so aus, daß der Schlauch steif wird und die Gefahr besteht, daß der elektrische Leiter nach kurzer Gebrauchsdauer beschädigt wird oder bricht.

Schließlich ist es auch schon bekannt, den elektrischen Leiter in einen freien Raum zwischen zwei konzentrischen Schläuchen zu legen. Auch in diesem Fall sollte der Leiter in Form einer Schraube gewickelt werden, wenn Biegebelastungen des Leiters und dadurch verursachte Gefahren, daß es zum Bruch und zu Betriebsunterbrechungen kommt, vermieden werden sollen.

Der Erfindung liegt die Aufgabe zugrunde, einen zur Aufnahme wenigstens eines elektrischen Leiters geeigneten Schlauch zu schaffen, der sich leicht herstellen und montieren läßt. Zur Lösung dieser Aufgabe wird erfindungsgemäß vorgeschlagen, daß die Nuten, welche zur Aufnahme der elektrischen Leiter dienen, als schraubengangförmige, nach außen offene Schwalbenschwanznuten ausgebildet sind.

Die Erfindung wird nachstehend an Hand eines in der Zeichnung dargestellten Ausführungsbeispiels näher erläutert.

Es zeigen: . 4.

Fig. 1 eine perspektivische Seitenansicht eines Schlauchs gemäß der Erfindung,

Fig. 2 einen Querschnitt durch den Schlauch nach Fig. 1,

Fig. 3 einen Längsschnitt durch einen Schlauch gemäß der Erfindung.

Der in der Zeichnung dargestellte, insgesamt mit 1o bezeichnete Schlauch besteht aus leicht biegsamem Material und bildet eine selbsttragende Einheit. Zwischen äußeren Rippen 11 ist wenigstens eine schraubengangförmige Nut 12 ausgebildet, die einen elektrischen Leiter 13 aufnehmen kann. Wie die Zeichnung zeigt, sind die Nuten 12 Schwalbenschwanznuten. Es sind insgesamt sechs parallellaufende Nuten vorgesehen, von denen im Ausführungsbeispiel zwei elektrische Leiter 13 aufnehmen. Jede Nut hat eine Steigung von ungefähr 5 bis 1ocm.

Wie aus Fig. 2 hervorgeht, bewirkt die im Verhältnis zur Bodenbreite schmalere Breite der Öffnung 18 der Nuten, welche durch die Kanten 14 begrenzt wird, daß die elektrischen Leiter 13 etwas zusammengedrückt werden. Auf diese Weise wird verhindert, daß die elektrischen Leiter aus ihren Nuten fallen. Gleichzeitig erlauben die Maße der Nuten jedoch ein gewisses Maß an Beweglichkeit der elektrischen Leiter in ihren Nuten. In einer praktischen Ausführung wurde z.B. die Tiefe der Nuten, gemessen von ihrem Boden 15 bis zur äußeren Mantelfläche 16 des Schlauchs, so dimensioniert, daß sie etwas größer war als die Dicke der elektrischen Leiter. Der Querschnitt der Nuten ist im wesentlichen ein Dreieck mit gleichlangen Schenkeln 17, wobei die äußeren Enden der Schenkel fehlen.



El I 1[illegible]/8.2.1977

Da der Schlauch 1o aus einem einzigen Stück besteht und der elektrische Leiter in sehr einfacher Weise von außen in die Nut 12 durch deren Öffnung 18 eingeführt werden kann, sind Herstellung und Montage einfach und billig. Falls gewünscht, kann der Schlauch mit den darin eingebetteten elektrischen Leitern auch noch zusätzlich mit einer geflochtenen Hülle umgeben werden.

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Patentansprüche /

1516612 COMPLETE SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

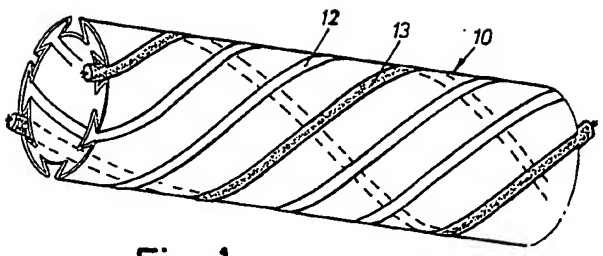


Fig. 1

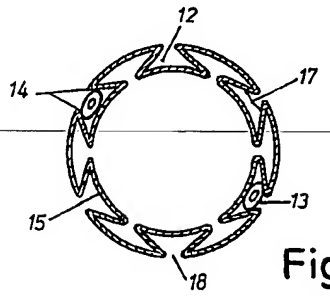


Fig. 2

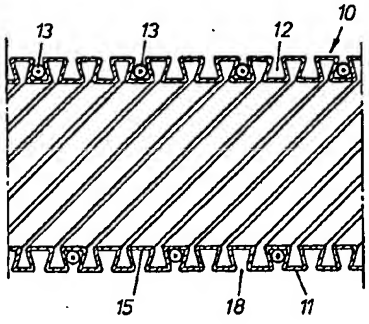


Fig. 3

# PATENT SPECIFICATION (11) 1 516 612

1 516 612

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F2P 1A12 1A19B 1A9 1B7



## (54) HOSE INCLUDING ONE OR MORE THAN ONE ELECTRIC CONDUCTOR

(71) We, ELECTROLUX LIMITED, a British company, of Electrolux Works, Luton, Bedfordshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a flexible hose including one or more than one electric conductor, for use for example with a vacuum cleaner.

It is known to equip a hose with one or more than one electric conductor for connecting a motor-driven implement, e.g. a motor-driven rotary barrel brush of a vacuum cleaner nozzle, to the vacum cleaner. Thus handling of the implement is made easier, as no loose cables between the vacuum cleaner and the implement are required.

A hose is known, in which an electric conductor is wound mainly helically around a layer of resilient material, surrounding an inner hose wall. Thus, the conductor is more or less embedded in the resilient material, which results in the hose being rather stiff and difficult to handle.

Alternatively, it has been suggested to provide a hose with more than one wall layer and to place the electric conductor in a groove formed in one of the layers. Thus, the hose will to some extent be flexible, owing to the conductor being somewhat movable, mainly in axial direction, so that most of the stress resulting when the hose is bent, is taken up by the hose itself and not by the conductor. If the conductor is subject to such stress the hose will become stiff and there will be a risk of the conductor being damaged or broken after some time in use.

Moreover, it is known to place the electric conductor in a free space between two concentric tubes. Also in this case it is important to arrange the conductor in the form of a helix in the longitudinal direction of the hose, to avoid bending stress in the conductor and the risk of breakage and interruption of service.

An object of the invention is to make a hose in a relatively simple way, equipped with an electric conductor or conductors and adapted for use with a vacuum cleaner.

According to this invention there is provided a flexible hose having one or more than one electric conductor and comprising a single tube of flexible material which has at least one radially outwardly narrowing open groove containing a single conductor, the or each groove being helical in the length direction of the hose and being adapted to receive and retain a conductor therein.

One embodiment of the invention will now be described by way of example, with reference to the accompanying diagrammatic drawing, in which:—

Figure 1 is a perspective view;
Figure 2 is a cross section; and
Figure 3 is a longitudinal section.

A hoes 10 is made of flexible material, for example plastics, and is self-supporting. It has corrugations 11, which are shaped so that at least one radially outwardly narrowing groove 12 which is helical in the longitudinal direction of the hose and is open at the outside of the hose, is formed. In this groove on electric conductor 13 is accommodated. In the present embodiment six such concentric grooves 12 are shown, arranged next to each other at the outer surface of the hose. Two of the grooves contain electric conductors 13. Each groove has a pitch of about 5 to 10 cm.

As appears from Figure 2 the width of the opening 18 of the groove, which is defined by two edges 14, somewhat decreases the thickness of the conductor 13. In this way the conductor is prevented from falling out of the groove, but at the same time the dimensions of the groove also allow some degree of movability of the conductor in the groove. For instance, the depth of the groove, i.e. the distance between the bottom 15 of the groove and the outer surface 16 of the hose, is such that it somewhat exceeds the thickness of the conductor. The cross section of the groove is mainly triangular with equal sides 17 forming the radially outwardly narrowing groove, and one apex of the triangle, directed towards the outer surface 16 of the hose, omitted.

As the hose 10 is a one-piece structure and the conductor is inserted in a simple way from the outside into the groove 12 through the opening 18 the hose is relatively simple and cheap to manufacture. Alternatively, and principally for aesthetic reasons, a braided case may be applied around the hose.

WHAT WE CLAIM IS:—

1. A flexible hose having one or more than one electric conductor and comprising a tube of flexible material which has at least one radially outwardly narrowing open groove containing a single conductor, the or each groove being helical in the length direction of the hose and being adapted to receive and retain a conductor therein.

2. A hose according to claim 1 which is corrugated with a plurality of the grooves.

3. A hose according to claim 1 wherein the width of the opening of the or each groove is less than the thickness of the conductor.

4. A hose according to any preceding claim wherein the distance between the bottom of the or each groove and the outer surface of the hose exceeds the thickness of the conductor.

5. A hose according to any preceding claim wherein several concentric helical grooves are arranged next to each other, at least one of the grooves retaining a conductor.

6. A hose according to any preceding claim wherein the pitch of the or each groove is from 5 to 10 cms.

7. A hose according to claim 1 wherein the cross section of the or each groove is mainly triangular with equal sides forming the narrowing portion of the groove, that apex of the triangle which is directed outwardly being omitted so that the groove is open.

8. A flexible hose constructed and arranged substantially as herein described and shown in the drawing.

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